CLAIMS

1. A method of manufacturing a slotted substrate comprising:

forming a masking layer over a front side of a substrate;

patterning and etching the masking layer to form a hole therethrough;

depositing a first layer over the masking layer and in the hole;

patterning and etching the first layer to form a plug in the hole; and

continuously etching a back side of the substrate until a bottom surface of the plug is substantially exposed and a slot in the substrate is substantially formed.

2. The method of claim 1 further comprising immediately etching to remove the plug after etching the back side of the substrate to form the slot.

3. The method of claim 1 further comprising forming another masking layer over the back side of the substrate, and patterning and etching the other masking layer before etching the substrate.

4. The method of claim 1 wherein the substrate is etched with at least one of TMAH, KOH, and other alkaline etchants.

5. The method of claim 1 further comprising forming a recess in the substrate corresponding with the hole in the masking layer, wherein the plug extends into the recess.

6. The method of claim 1 wherein the first layer is at least one of silicon dioxide, silane-based silicon dioxide, silicon nitride, field oxide, silicon carbide, silicon oxynitride and TEOS.

7. The method of claim 1 further comprising etching an interface of the substrate and the first layer along the bottom surface of the plug at a first rate; and etching an interface of the substrate and the masking layer at a second rate that is slower than the first rate.

8. The method of claim 1 further comprising substantially etching an interface of the substrate and the first layer along the bottom surface of the plug in the etching of the substrate slot.

9. The method of claim 1 further comprising defining dimensions of an opening in the front side of the substrate by utilizing the plug, wherein dimensions of the plug substantially correspond to the dimensions of the opening.

10. The method of claim 1 further comprising utilizing the plug to align the trench to the hole etched into the masking layer on the front side of the substrate.

11. A method of manufacturing a fluid ejection device comprising:
forming a masking layer over a first surface of a substrate;
patterning and etching the masking layer to form a hole therethrough;
depositing a first layer over the masking layer and in the hole;
patterning and etching the first layer to form a plug in the hole; and
continuously etching a second surface opposite the first surface of the substrate until a bottom surface of the plug is substantially exposed and a slot in the substrate is substantially formed.

12. The method of claim 11 further comprising etching to remove the plug after etching the substrate to substantially form the slot through the substrate.

13. The method of claim 11 further comprising depositing a thin film stack including a fluid ejector over the first surface of the substrate and under the masking layer.

14. The method of claim 12 further comprising depositing a thin film stack including a fluid ejector over the first surface of the substrate.

15. The method of claim 14 wherein there are multiple plugs in the front side of the substrate, the method further comprising defining a firing chamber formed over the thin film stack and defining a plurality of holes through the substrate after removing the plug, wherein at least two of the holes feed into the firing chamber.

16. The method of claim 11 wherein the slot is etched with at least one of TMAH, KOH, and other alkaline etchants.

17. The method of claim 11 wherein the slot has a first wall section adjacent the plug, and a second wall section adjacent the second surface, wherein the first wall section extends from the plug adjacent edges of the plug towards the second surface, and the second wall section is shaped substantially as a truncated pyramid and couples with the first wall section.

18. The method of claim 11 wherein the slot has a first wall section adjacent the first surface, a second wall section, and a third wall section adjacent the second surface, wherein the second wall section is in between the first and third wall sections, wherein the first and third wall sections are shaped substantially as truncated pyramids, and the second wall section has walls that couple the truncated pyramids.

19. A slotted substrate comprising:

a substrate having a first surface, a second opposite surface, and a slot extending from the second surface towards the first surface;

a masking layer formed over the first surface, the masking layer having a hole therethrough corresponding to the slot; and

a plug formed into the hole of the masking layer and having a bottom surface that is substantially exposed in the slot.

20. The slotted substrate of claim 19 wherein the slot has a first wall section adjacent the plug, and a second wall section adjacent the second surface, wherein the first wall section extends from the plug adjacent edges of the plug towards the second surface, and the second wall section is shaped substantially as a truncated pyramid and couples with the first wall section.

21. The slotted substrate of claim 19 wherein the slot has a first wall section adjacent the first surface, a second wall section and a third wall section adjacent the second surface, wherein the second wall section is in between the first and third wall sections, wherein the first and third wall sections are shaped substantially as truncated pyramids, and the second wall section has walls that couple the truncated pyramids.

22. The slotted substrate of claim 19 wherein the plug is composed of at least one of silicon dioxide, silane-based silicon dioxide, silicon nitride, field oxide, silicon carbide, silicon oxynitride and TEOS.

23. The slotted substrate of claim 19 wherein the first surface has a recess, wherein the plug is formed into the recess, and the recess couples the hole and the slot.

24. A process comprising:

forming a first masking layer over a front side of a silicon substrate;

patterning and etching the first masking layer to form a hole therethrough;

depositing a front side protection layer over the first masking layer and in the hole;

patterning and etching the front side protection layer over the hole;

forming a second masking layer over the back side of the substrate;

patterning and etching the second masking layer;

continuously etching a back side of the substrate with an alkaline etchant until a bottom surface of the front side protection layer in the hole is substantially exposed and a slot in the substrate is substantially formed; and

etching with a buffered oxide etch to remove the front side protection layer after etching the back side of the substrate to form the slot through the substrate.

25. The process of claim 24 wherein a material for the front side protection layer includes at least one of silicon dioxide, silane-based silicon dioxide, silicon nitride, field oxide, silicon carbide, silicon oxynitride and TEOS.

26. The process of claim 24 further comprising substantially etching an interface of the substrate and the front side protection layer along the bottom surface of the protection layer in the etching of the substrate slot, wherein an etch rate along the interface is at least twice an etch rate of the substrate before the front side protection layer is exposed.